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An Analysis of Post-Service Career Earnings
of Female Veterans

by

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Submitted in partial fulfillment
of the requirements for the degree of

MASTER OF SCIENCE IN MANAGEMENT

ABSTRACT

This thesis analyzes the post-service earnings of female veterans. A review of the literature on veterans' post-service earnings was conducted to gain some insight on the topic. The literature on womens' labor force participation was also reviewed. An empirical analysis was conducted based on a dataset constructed from the Reserve Components Survey of 1986. A log-earnings model was specified based on human capital theory. The intent of the model was to measure the effects of military training and veteran status on the post-service earnings of female veterans. These results were compared to a similar model of male veterans to analyze gender differences in veteran-nonveteran wage differentials. Overall, no measurable loss of income was incurred by female veterans who transferred their military skills to the civilian sector. Nonwhite females realized the greatest return to earnings from military experience. Also, those female veterans who transfer their military-acquired skills may be closing the wage gap between themselves and male nonveterans. The relative gains in wages from military experience may last up to an average of nine years for female veterans.

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I. INTRODUCTION

A plethora of issues surrounds the subject of women's roles in the military. Among these are:

- females occupying traditionally male military occupations;
- assignment of women in combat-related job categories;
- equity in the distribution of men and women among all military job categories;
- female officer career patterns influencing selection for command;
- inequity in sea/shore rotation for navy enlisted.

This thesis will focus exclusively on the impact of military training and experience on the post-service earnings of female veterans as an extension of females in traditionally male occupations.

Much has been written regarding the effect of military training on the post-service earnings of male veterans. These studies have found that the transfer of most types of military training and experience has had a significant impact on veterans' lifetime earnings.

Women's earnings functions cannot be expected to behave in the same fashion as men's. Certain gender-related labor force decisions come into play when determining variables for an econometric model that deals with women who enter the service.

Female participation in the Armed Forces is purely voluntary. There may be a bias towards self-selection into

male-oriented occupations, which is not characteristic of the entire female population. On average female enlistees have higher mean AFQT scores than male enlistees. Since one factor in job placement is the AFQT composite score, proportionately more women on average may qualify for skilled positions. There may be a propensity for high-ability women who enlist in the services to seek out occupations that are traditionally held by men. This self-selection into male-oriented occupations may not be characteristic of the entire female population.

Women have been entering high-tech military jobs that were traditionally male bastions at an increasing rate. There is evidence that these types of jobs are economically beneficial to the veteran's post-service career earnings. If the military acts as a "bridge" for women to overcome sex-biased obstacles to male-dominated occupations, female veterans would enjoy greater job opportunities than do their civilian counterparts. The higher potential productivity of female veterans and the savings that private firms would realize in training costs from hiring women with military backgrounds should translate into higher wages for the prospective employee and into general social benefits.

In this thesis, an econometric analysis of the Reserve Components Survey will be conducted to specify and estimate a human capital earnings model for female veterans and nonveterans. By examining the accompanying statistics, the

model's validity will be determined. Care has been used to ensure that all chosen variables and the functional form of the equation are relevant to the study. The Reserve Components Survey contains data on females who have chosen to enlist in the active force and those who have not. The self-selection bias that would ordinarily be associated with comparing groups from the civilian sector with those from the military sector is reduced. The Reserve Components Survey data controls for background, taste, and ability factors which are normally the source of selection bias. Therefore, the cohort under investigation should be more homogeneous, which will improve our ability to decompose the effect of the explanatory variables. Minimizing selectivity bias will mean the economic return to service in the armed forces can be estimated more accurately.

The purpose of this study is to:

1. extract information from the Reserve Components Survey for the year 1986 in order to apply Ordinary Least Squares methods to measure the effect of military training, demographic, socioeconomic, and other explanatory variables on the earnings of female veterans;
2. determine if military service is more valuable to female veterans than to their male contemporaries, and
3. recommend areas for follow-on research.

The thesis is structured as follows: Chapter II discusses the history of women in the labor market and in the Armed Forces. A review of human capital theory is also contained in this background section.

Chapter III contains the review of pertinent literature. Topics reviewed include the effects of military training on men's post-service earnings as well as information regarding the current military force composition. The role of women in the armed forces is included in this chapter.

Chapter IV presents a description of the Reserve Components Survey and the data drawn from this survey. The specification of the earnings model is contained in this chapter. The chapter also presents the empirical estimates of the veteran - nonveteran earnings differential.

Chapter V contains the conclusions and final recommendations. Implications for current policies and recommendations for further study are presented in this section.

The goal of this thesis is to develop a model that will analyze the effect of military service and training on female veterans' post-service earnings. The analysis will test the hypothesis that those women who transfer their military-acquired skills into the civilian labor force will tend to improve their economic status relative to their civilian counterparts, all other factors being equal. With the downsizing of the military and given the current political climate, this study should be of significant value to manpower policy-makers.

II. BACKGROUND

A. Economic Issues

To measure the effects of transferring military acquired skills to the general labor market, we must examine and compare the two markets. Transferability of skills requires some similarity of job characteristics. Generally speaking, the greater the degree of similarity between the military and civilian occupations, the easier the transition for the veteran and the lower the cost of retraining to the firm.

The decision to seek training and employment is based on the utility difference between staying home and the wages that could be earned. The cost of going to work can be measured by summing the tasks performed by the individual at home that can not be done if she works. Also, the value of leisure must be included in this equation. The individual will work if the value of acquired earnings is greater than the costs associated with working.

Investment in human capital is an individual decision based on the benefits one would receive from the time spent developing skills. The individual must measure the difference between the benefits received from the investment (pecuniary as well as non-wage benefits) and from the costs of training.

A fair amount of time may be necessary to recover all of the costs associated with skill acquisition. Blau and Ferber (1986) noted in their work on women in the labor force that women tend to have disjointed careers. This factor affects their wages in two ways. Women tend to have a shorter work life than men, which reduces the return to the individual's investment. Time spent out of the work force will diminish the skills that one has developed. This will affect a woman's wages for the remainder of her working life (Blau and Ferber, 1986). If a woman can expect to receive less from the acquisition of skills, she will be less likely to invest in training.

The labor market participation rates for females will continue to change as the factors that affect their decision to seek employment fluctuate over time. One major factor is the implicit barrier to traditionally male occupations. There are many factors that have helped build and maintain these obstructions, although they have eroded recently. These factors are:

- societal attitudes
- female job seeker's utility
- women as head of household
- women's attitudes towards job training, and
- delays in starting families

Some of these factors are sociological in nature. They are driven by public attitudes and perceptions. Others are purely

economic in nature. Much of the change in women's roles in the labor force is due to some combination of these factors.

As more women enter the work force, it is only logical to assume that they will seek out the higher paying, traditionally male jobs. Normally, access to these types of employment is restricted due to the large amount of training required to perform adequately. However, women are accepting the challenge to overcome this obstacle to success by acquiring technological training through formal schooling and joining the military. As the labor market barriers keeping women at home erode and the benefits of entering the work force increase, more women will be willing to invest in their economic future.

B. Women in the Workforce

The work history of women in the twentieth century reflects changing participation rates, training levels, and propensity to increase tenure with a single firm. These are the key ingredients in an individual's earnings profile. Some of the changes in participation rates can be explained by fluctuations in societal attitudes and other demographics. The blossoming United States economy and its subsequent demand for laborers contributed to the dramatic female participation rate increases of the late 1970's, which are continuing today. The following sections briefly review the history of female labor

force participation, first for the period 1900-1970, and then for 1970 to the present.

1. 1900 - 1970

The early years of the twentieth century found mostly single women in the labor force. Hiring married women was frowned upon as a matter of personnel policy. Thus, since marriage was the norm, access to on-the-job training as well as schooling was limited for many females.

Single females were hired to work in specific job classifications. Prevailing attitudes of the day set aside certain job categories as traditionally male. The evolution to white collar office professionals was the first opportunity for women to access higher paying jobs.

World War II caused a dramatic shortage of manpower. The slack in the labor supply was picked up by women eager to help the war effort. Barriers to certain traditionally male occupations were dropped as a matter of necessity. The absence of male workers and the reduction in birth rates allowed women to enter the labor market during this period. Women had proven their ability to handle traditionally male jobs. The post World War II time frame found an increasing birth rate and a return to the pre-war status quo in the labor market. From 1950 to 1970, relative pay rates (female-male ratio) remained nearly constant at approximately the 60 percent level.

Table 1 shows that during the period from 1948 to 1964, 10,962,000 new positions (or 685,125 per year) were created. Women accounted for 66% of the growth (7,214,000 new jobs). Most of the positions taken by women were low-skill, entry-level jobs.

Participation rates for women increased by 6.0 percent (Table 2), from a rate of 32.7 in 1948 to a rate of 38.7 in 1964. Male participation rates during this time frame declined by 5.6 percent. Women realized an average gain of .59 percent per year for the period of 1948 to 1990 (Table 2).

Labor market experience¹ levels for women decreased slightly from 1950 to 1965. For the period beginning in 1965 and lasting until the 1980's, labor market experience levels for women grew an average of 8.5 percent for all age categories (Table 3).

Education levels for women actually declined from 1950 to 1965. Table 4 shows that growth in education levels for men outpaced changes in education levels for women by an average of nearly 50 percent across the 20 to 40 year age range for the period from 1950 to 1970.

The post World War Two years showed no significant increase in earnings for women. Hourly wages for women of all age groups still averaged 61.5 percent of those earned by men

¹Labor market experience levels are measured by the number of years the individual has invested in the workforce. Table 3 expresses this value in fractions of a year.

in 1968 (Table 5). Birth rates increased dramatically after the war while investment in education decreased. Experience levels for 20 and 25 year old women fell 11.4 and 29.0 percent, respectively, from 1950 to 1965. Labor market participation rates increased for some groups of women while the economy experienced a period of solid growth.

2. 1970 to the Present

Social attitudes towards gender and racial barriers to traditionally white male occupations changed dramatically during this period. Women began to invest more in human capital through schooling. Declining birth rates allowed for more time to be invested in the labor market. Length of service (i.e., experience) numbers also increased. These factors reflected positive changes in skill levels for women and a rising commitment to the labor force. Increasing human capital investment and labor force experience led to improved access to higher paying jobs. Moreover, women showed a greater propensity to ignore gender boundaries in the labor market.

In 1964, the baby boomers began entering the labor market. From 1964 to 1990, Table 1 shows that total jobs grew by 48,609,000 new positions (1,869,000 per year). Growth in positions occupied by women was 29,648,000. This translates into 61 percent of the total growth during the period. Female participation rates grew from 38.7 to 57.5 percent for a total increase of 18.8 percent from 1964 to 1990 (Table 2). Annual

growth in female participation rates was nearly double that of the previous period, or .72 percent per year.

Labor market experience levels for those women 30 years of age and younger improved by 14.5 percent between 1965 and 1980. Table 4 shows that for the period from 1970 to 1980, men 25 and older increased their education level (measured in years) an average of 14.75 percent over women from the same age groups. However, women who were between 20 and 25 years of age increased their education level by 110 percent compared to men from this group. Table 5 reveals that although females' wages as a percent of males' were nearly constant from 1964 to 1980, relative wages increased significantly for 20-44 year old females during the early 1980's, averaging just over seven percent. The group of 45-64 year old females' relative wage improvement was less dramatic (approximately 2.2 percent). Table 6 presents data on male income as a percent of female income for various experience levels and time frames. It shows that the investment in human capital accomplished by women during the 1970's has paid off for all experience and education levels.

Table 7 presents relative wage data by educational level for 1976 and 1982. Women have been experiencing a period of high return on human capital investment during this time-frame. Increases in educational investment have helped close the wage gap for women and improved their economic condition relative to their male counterparts. Females in all categories

experienced an average of 4.3 percent growth in wages relative to those of men between 1976 and 1982.

3. General Observations

Some gender barriers were lowered during World War II due to necessity. Women proved themselves to be quite capable at adapting to traditionally male kinds of work. The post war period saw the labor market return to the status quo, but only for a while. The largest increase in female participation rates was among the least trained. Many of the employed women were part-time workers.

During the 1970's, a large influx of women into the labor market set the stage for wage growth and changing labor force composition. Increasing education levels and job experience positioned women to compete more aggressively with men for the higher paying, traditionally male jobs. Birth rates also fell, providing women with the opportunity to pursue human capital investments.

Participation rates among the most educated and well-trained women increased during this period. Women closed the wage gap by an average of 13.6 percent for all groups from 1979 to 1987 (Table 6). Growth in the daycare industry could be a key indicator of the growing influx of women into the labor force. The labor market of the 1990's and the next century should see dramatic changes in wage differentials.

TABLE 1
CIVILIAN EMPLOYMENT BY GENDER
(IN THOUSANDS)

Year	Male	Female	Total
1948	41,725	16,617	58,343
1950	41,578	17,340	58,918
1952	41,682	18,568	60,250
1954	41,619	18,490	60,109
1956	43,379	20,419	63,799
1958	42,423	20,613	63,036
1960	43,904	21,874	65,778
1962	44,177	22,525	66,702
1964	45,474	23,831	69,305
1966	46,919	25,976	72,895
1968	48,114	27,807	75,920
1970	48,990	29,688	78,678
1972	50,896	31,257	82,153
1974	53,024	33,769	86,794
1976	53,138	35,615	88,752
1978	56,479	39,569	96,048
1980	57,186	42,117	99,303
1982	56,271	43,256	99,526
1984	56,091	45,915	105,005
1986	60,892	48,706	109,597
1988	63,273	51,696	114,968
1990	64,435	53,479	117,914

Source: Department of Labor, Bureau of Labor
Statistics

TABLE 2

CIVILIAN LABOR FORCE PARTICIPATION RATES BY			
Year	Male	Female	Total
1948	86.6	32.7	58.8
1950	86.4	33.9	59.2
1952	86.3	34.7	59.0
1954	85.5	34.6	58.8
1956	85.5	36.9	60.0
1958	84.2	37.1	59.5
1960	83.3	37.7	59.4
1962	82.0	37.9	58.8
1964	81.0	38.7	58.7
1966	80.4	40.3	59.2
1968	80.1	41.6	59.6
1970	79.7	43.3	60.4
1972	78.9	43.9	60.4
1974	78.7	45.7	61.3
1976	77.5	47.3	61.6
1978	77.9	50.0	63.2
1980	77.4	51.5	63.8
1982	76.6	52.6	64.0
1984	76.4	53.6	64.4
1986	76.3	55.3	65.3
1988	76.2	56.6	65.9
1990	76.1	57.5	66.4

Source: Department of Labor, Bureau of Labor
Statistics

TABLE 3
YEARS OF LABOR MARKET EXPERIENCE
(FEMALES)

Year	<u>Age</u>					
	20	25	30	35	40	45
1950	2.81	5.87	7.97	10.57	13.99	16.43
1955	2.74	5.80	8.88	10.72	13.39	16.95
1960	2.70	5.76	8.48	11.83	13.68	16.58
1965	2.49	5.58	8.53	11.29	14.24	16.52
1970	2.63	5.69	8.68	11.21	14.24	17.21
1975	2.81	6.02	8.83	11.39	14.06	17.05
1980	3.00	6.23	9.50	11.70	14.39	16.97

Source: Department of Labor, Bureau of Labor Statistics

TABLE 4
CHANGE IN MALE EDUCATION (IN YEARS) RELATIVE TO
FEMALE EDUCATION

Year	<u>Age</u>				
	20	25	30	35	40
1950-1970	.43	.60	.36	.42	.66
1970-1980	-1.1	.16	.11	.14	.18

Source: Kusters, 1991

TABLE 5
HOURLY WAGES OF WOMEN AS A PERCENT OF THOSE OF MEN
IN THE SAME AGE GROUP

Year	<u>Age Group</u>				
	20-24	25-34	35-44	45-54	55-64
1964	82.0	62.0	55.2	57.4	60.7
1968	74.5	62.9	53.2	55.8	61.2
1972	76.4	64.9	53.2	55.8	61.2
1976	77.8	67.5	55.7	53.8	57.4
1980	77.7	68.8	56.2	54.3	56.7
1986	86.2	75.3	62.3	57.0	58.3

Note: Derived from multiple sources

TABLE 6
MALE / FEMALE WAGE RATIOS, YEARS OF EXPERIENCE,
AND YEARS OF EDUCATION

<u>Yrs Exp</u>	<u>Yrs Ed</u>	<u>1973</u>	<u>1979</u>	<u>1987</u>	<u>% Δ(1979- 1987)</u>
5	8	1.44	1.29	1.14	-15.0%
	12	1.29	1.29	1.16	-13.0
	16	1.29	1.24	1.15	-9.0
15	8	1.60	1.58	1.39	-19.0
	12	1.55	1.53	1.31	-22.0
	16	1.55	1.51	1.34	-17.0
25	8	1.85	1.59	1.46	-13.0
	12	1.66	1.59	1.48	-11.0
	16	2.04	1.72	1.59	-13.0
35	8	1.74	1.63	1.59	-4.0
	12	1.62	1.61	1.47	-14.0

Source: Kusters, 1991

TABLE 7
HOURLY WAGES OF WOMEN AS A FRACTION OF THOSE OF MEN
BY AGE AND EDUCATION LEVEL

<u>Education level</u>	<u>Ages 25 - 34</u>		<u>Ages 35 - 44</u>	
	1976	1982	1976	1982
Post Graduate	74.4	78.2	61.5	65.1
College Degree	69.9	73.5	54.4	63.3
High School Grad	64.7	69.1	56.7	58.1

Source: Kusters, 1991

C. Women in the Military

Women's participation in the military has been limited by the types of occupations that they have been able to enter. Before the early 1970's, women could not represent more than two percent of the total force, by law. Their roles were strictly limited to noncombat and support positions.

Table 8 shows that 88.8 percent of white women, 94 percent of black women, and 92.6 percent of hispanic women in the armed services in 1972 were in the occupational skill category classified as "semiskilled" (Eitelberg, 1988). This category is comprised of traditionally female occupational fields such as medical specialist, dental specialist, and administrative

TABLE 8
PERCENTAGE DISTRIBUTION OF ENLISTED PERSONNEL, ALL
SERVICES BY SEX, OCCUPATIONAL SKILL CATEGORY, AND
RACIAL/ETHNIC GROUP, 1972 AND 1984

	1972			1984		
Skill Category	White	Black	Hisp.	White	Black	Hisp.
Male						
Unskilled	28.2	43.8	39.8	31.7	36.3	32.8
Semiskilled	48.0	44.9	45.9	41.4	44.8	47.3
Skilled	23.8	11.3	14.3	26.9	18.9	19.9
Total	100.0	100.0	100.0	100.0	100.0	100.0
Female						
Unskilled	1.8	2.8	2.2	14.0	13.2	11.9
Semiskilled	88.8	94.0	92.6	60.6	69.6	69.8
Skilled	9.4	3.2	5.2	25.4	17.2	18.3
Total	100.0	100.0	100.0	100.0	100.0	100.0

Source: Eitelberg, 1988

support. During this period, limited access was granted to women in the "skilled" positions, primarily communications and intelligence (9.4, 3.2, and 5.2 percent respectively). Very few women (1.8, 2.8, and 2.2 percent respectively) were in occupations classified as "unskilled" because a majority of these positions were considered to be directly related to combat and women were excluded from many of them.

During the late 1970's and the 1980's, the distribution of females in military occupational categories changed significantly. Moreover, the proportion of women in the service increased nearly seven-fold, from a low of 1.4 percent in 1965 to 9.2 percent in 1987 (Table 9). By 1984 female participation in the "unskilled" category was, at most, less than half the rate of their male contemporaries (Table 8). Women comprised nearly the same percentage of "skilled" occupations as did men in 1984. Still, a majority of women remained in the "semiskilled" job classification category.

Movement of women from the "semiskilled" category to both the "unskilled" and the "skilled" categories can be thought of as "progress towards 'equity of service' or 'equal opportunity'" (Eitelberg, 1988). On average, women as a group more than tripled their participation rate in the "skilled" category from 1972 to 1984. Since this category requires advanced occupational training, which may be sought by civilian employers, movement into the "skilled" occupational

TABLE 9
RESIDENT ARMED FORCES BY SEX, 1950-1987
(IN THOUSANDS)

Year	Males	Females	Total	Percent Female
1950	1,150	19	1,169	1.6
1955	2,033	31	2,064	1.5
1960	1,833	28	1,861	1.5
1965	1,920	27	1,946	1.4
1970	2,081	37	2,118	1.7
1975	1,600	78	1,678	4.6
1980	1,479	124	1,604	7.7
1985	1,556	150	1,706	8.8
1987	1,577	160	1,737	9.2

Source: Department of Labor, Bureau of Labor Statistics

category should benefit women economically in their post-service careers. Good jobs are those that develop marketable skills.

It is interesting to note that as more occupations are opened to women and greater numbers of women are allowed to enter the military, the services may be forced to be less

selective of enlisted female applicants. If women's AFQT scores fall, more women will find themselves in the least economically desirable category of "unskilled".

Labor force participation rates for female veterans are nearly equivalent to those of nonveterans. When pre-Vietnam era veterans are eliminated, the participation rate increases to approximately 75 percent. This represents nearly a 20 percent increase in labor force participation for female veterans compared to their nonveteran counterparts. Their unemployment rate was estimated at about five percent in 1986 (Roca, 1986). Wage differentials (by gender and military experience) will be estimated for male and female veterans in the final section of this thesis.

III. REVIEW OF PERTINENT LITERATURE

Long term decisions regarding education, employment, and training are made by individuals weighing the perceived costs and economic gains from pursuing each alternative. Women who join the all-volunteer military do so expecting to better themselves by obtaining immediate employment and improving their work skills.

The military offers a salary that is generally higher than can be earned in the civilian labor market by a recent high school graduate. Also, skill training is offered, to those who qualify, that is often valuable to civilian firms. Much of the training that is offered by the military could be acquired through continued education and trade schools at a (direct and indirect) cost to the individual. Because the military bears the costs and also pays an enlistee's salary during training, the military can be a very attractive post-high school alternative.

Leaving the military is both a social and economic decision. Economists have attempted to estimate the cost associated with reenlisting in the military, which is part of the economic equation that is used to determine the decision to leave the military. The other portion of this equation is the potential earnings offered by civilian firms that are foregone if one reenlists. The explanatory variables often

associated with the potential civilian earnings function of an individual service member include:

- Length of service in the military
- Skill type or MOS
- Skill transferability to the civilian sector
- Education level

These variables (and a host of others) have been considered by many authors who have investigated enlistees' civilian earnings potential.

A preponderance of literature has been written regarding the transferability of military-acquired skills to civilian labor markets for male veterans. Other studies have investigated the role of women in the civilian labor market. Literature pertaining to female veterans' post-service earnings is virtually nonexistent. However, econometric models developed to investigate post-service labor market outcomes for male veterans should be applicable to female veterans with only minor modifications.

The following section will investigate other studies that have estimated models to describe and decompose the determinants of an individual's wages. Initially, this thesis will discuss the concept of the military acting as a "bridge" to facilitate the acquisition of quality skill training by minority veterans. The concept of "bridging" may also be applicable to females. The next topic will be the feasibility of military entrance requirements acting as a screening device

for civilian employers who are seeking to hire veterans. The topic of transferability of military-acquired skills has been noted in previous studies and also will be presented in this chapter. Finally, a comparison of econometric models that have been used to determine the variables that affect an individual's earnings potential will be examined.

A. The Bridging Effect

For certain groups of veterans, positive returns for military experience are consistent with the military acting as a "bridge" from school to the civilian work force. Minority veterans gain access to training and skill development that is not normally available to their peers who do not enter the armed forces. The military assists some groups to cross socio-economic boundaries by improving their work habits, specific occupational skills, and their productivity.

Martindale and Poston (1979), for example, found that access to military skill training paid a premium to minority veterans. Working in the military environment and gaining experience at functioning within large bureaucratic organizations influences post-service earnings in a positive manner. Fredland and Little (1980) associated this gain in earnings with the acquisition of general skills.

B. The Military as a Screening Device

All servicemembers are required to qualify for entrance and for specific military occupations. The qualification process requires high performance on a battery of mental, physical, and moral examinations. Once employed in the armed forces, the servicemember gains experience in dealing with large bureaucracies as well as the value of good order and discipline. To the extent that a civilian employer is familiar with the on-the-job training received in the services, time in the military may be used by employers as a positive screen when evaluating the applicants.

Detray (1982) focused on the civilian employment screening process and stated that military status positively influences employers. Military training is considered an indicator of high productivity. Schwartz (1986) found that an employer may be either positively or negatively influenced by military experience depending on his or her perception of the military as an institution. Vietnam era veterans were considered to be negatively impacted by their military experience and were viewed as less attractive by civilian employers.

Military entrance examinations are purported to sift out the high quality, readily trainable individual from the average performer. Berger and Hirsch (1983) felt that qualifying for the military was a clear indication to an employer that the individual had characteristics that would be desirable. Much of the military training received during

enlistment could be classified as general training (Fredland and Little, 1980). Qualities such as work discipline, interpersonal communication skills, and others would be highly sought after by employers. Military qualification and training could be a good indicator of a successful and readily trainable employee. Those employers who understand the military recruiting procedures and training mechanism may actively seek out veterans to employ.

C. The Transferability of Military Acquired Skills

Transferability of military skills is dependent upon the servicemember's era and skill classification (Miller, 1991). Magnum and Ball (1989) found that roughly one-half of their study group felt that military employment helped them find work while approximately one-third actually transferred their acquired skills. Most of the general training received in the military is readily transferable, but whether veterans actually work at jobs that mirror those they held in the military depends on numerous, difficult to measure factors.

Many studies (Mehay, 1992; Bryant and Wilhite, 1990; Daymont and Andrisani, 1986) established that for the first two to three years after leaving the service, most veterans experienced an earnings dip. This initial loss of pay is considered to be consistent with earnings profiles of other (nonveteran) civilians who change jobs. After the third year, however, pay for veterans grew beyond that received by their

nonveteran contemporaries. The rate of increase in pay was continually greater for years after the break even point. Mehay (1992) and Norrbloom (1976) found that those veterans who transferred their military skills were even better off than their veteran contemporaries who did not.

Those with technical military specialties found their skills more readily transferable to the civilian marketplace. Since military job categories that are considered to be technical in nature are growing at a more rapid pace, "it is likely that the skill transfer between the military and civilian sectors is more prevalent now than in the past" (Miller, 1991).

D. Econometric Models of Earnings Potential

Model specification used to describe and decompose the determinants of an individual's wages takes on the form of the standard Mincer log-earnings function (Kosters, 1991). The generic equation is:

$$\ln\text{-earnings} = B_0 + B_1X_1 + B_2X_2 + e$$

where the $\ln\text{-earnings}$ represents the natural log of an individual's earnings; B_0 represents the intercept; B_1 and B_2 are the independent variables' coefficients; X_1 and X_2 are the independent variables, and e is the associated error term. The earnings variable has been measured in various studies as the hourly wage rate, or weekly earnings, or annual income.

Most studies reviewed for this thesis have used the log-earnings functional form in their statistical analyses. This functional form allows the researcher to investigate the effect of incremental changes in explanatory variables on the dependent variable "ln-earnings". Each variable's contribution to earnings can be isolated and compared in this specification.

Choosing variables for the earnings model is often based as much on limitations of the available data as well as on fundamental economic theory. Those models that used the National Longitudinal Survey, Youth Cohort (NLSY), (Bryant and Wilhite, 1991; Daymont and Andrisani, 1986; Bolin, 1980) included educational level achieved, civilian and military training, work experience, race, and length of military training as explanatory variables in their models. Table 10 lists the explanatory variables that were used in four prior All Volunteer Force-era studies. The variables that are common to all of these models in columns are education and experience. Race and marital status are also common to three of the models.

These models may be acceptable for generic studies regarding earnings potential, but the variables representing military training and experience may have less descriptive power when analyzing female veterans. Two models used the Reserve Components Survey (RCS), (Miller, 1991; Mehay, 1992) to explore the differences between veterans and nonveterans.

The RCS allows the researcher to compare individuals with similar tastes for military service, thus avoiding any bias associated with self-selectivity.

E. Summary

Econometric modeling requires some analysis of explanatory variables prior to their selection as inputs for the model. By reviewing all pertinent literature, the researcher can examine previous models and their associated variables for theoretical and statistical validity.

Variables that have proven to be statistically significant in previous studies should be considered for inclusion in the econometrician's model. Omission of relevant variables could lead to bias in the coefficients of the included variables (Studenmund, 1992). A complete study of relevant literature is required before the regression models are estimated.

TABLE 10
EXPLANATORY VARIABLES USED IN PRIOR
EARNINGS STUDIES

Mehay 1992	Bryant and Wilhite 1990	Bolin 1980	Daymont and Andrisani 1986
EDUCATION	EDUCATION	IQ	HS EDUC
EXPERIENCE	EDUCATION2	MIL TRAIN	COLLEGE
EXPERIENCE2	EXPERIENCE	CIV TRAIN	YRS OUT COL
SELF EMPL.	EXPERIENCE2	EDUCATION	AFQT
NONWHITE	RACE	RACE	LOS MIL
MARRIED	MARRIED	MARRIED	YRS OUT MIL
CHILDREN	AGE	AGE	
YRSOUT	UNEMPLOYMENT	LOS CIV	
YRSOUT2	GEO AREA		
PRIORSERV	OCCUPATION		
TRANSFER	INDUSTRY		
OCCUPATION	LOS MILITARY		
	SEX		

Source: Compiled from various sources

IV. DATA SET, METHODOLOGY, AND MODEL DETERMINATION

A. Data Set

This study uses information obtained from the 1986 Reserve Components Survey to investigate those factors that are significant determinants of the log-earnings of female veterans. The Reserve Components Survey was chosen because sampling includes responses from veterans² and nonveterans who are similar in many respects; therefore, any bias that may occur due to self-selection into the active components of the armed forces and prescreening of applicants will be minimized by using this survey. Although both prior active duty reservists (veterans) and those with no active duty experience (nonveterans) receive military training, the value to civilian firms of training received while on active duty should create significant differences in military-acquired skill proficiencies between the two cohorts. This difference in skill levels should influence the relationship between active duty training and future civilian wages.

The 1986 Reserve Components Survey was administered by the Defense Manpower Data Center in conjunction with the office of

²Veteran is defined as a reservist with active duty experience and training. Nonveteran is defined as a reservist who has not been on active duty and has received reserve training only.

the Deputy Assistant Secretary of Defense for Guard/Reserve Manpower and Personnel. The survey's purpose was to develop a data base for all reserve components that would be useful in investigating the effects of policy decisions regarding personnel issues. The basic sample included approximately 109,000 officer and enlisted reservists. Respondents were only considered if they were trained selected reservists. The response rate for the enlistees was 59.7 percent.

B. Methodology

1. Survey Questions

The Reserve Components Survey asked two questions regarding the respondents' civilian pay. One question focused primarily on weekly civilian earnings:

In 1985, what were your USUAL WEEKLY EARNINGS from your main civilian job or your own business before taxes and other deductions? Give your best estimate.

A second question was asked regarding annual earnings. This question asked the respondents to include all income.

During 1985, what was the TOTAL AMOUNT THAT YOU EARNED FROM ALL CIVILIAN JOBS or your own business before taxes and other deductions? Include earnings as a Guard/Reserve technician. Include commissions, tips, and bonuses. Give your best estimate.

The data set was divided into two basic subsamples: (a) female veterans and nonveterans, and (b) male veterans and nonveterans, to capture the value of active duty experience and direct military acquired skill transfer to the civilian workforce. Each subsample was used to investigate the natural

log of yearly income as the dependent variable for an ordinary least squares regression equation.

The distribution of the reserve force by gender is shown in Tables 11 and 12. Table 11 provides the percentage makeup for each of the branches of service and includes all components. The proportion of enlisted reservists who are female is highest for the Air Force Reserve (19 percent) and lowest for the Marine Corps (four percent). Officer and enlisted gender ratios are similar for the individual branches of service. Table 12 gives the population size for the reserve components. Air National Guard and Army National Guard personnel are combined with their respective reserve forces. Coast Guard Reserve personnel are excluded from this study.

2. Thesis Questions

Two primary questions are explored in this thesis; (1) Does active duty military experience of female reservists (veterans) improve their post-service earnings compared to nonveteran reservists? and (2) Does the direct transfer of military-acquired skills lead to higher wages in the civilian workforce? Question (1) is an attempt to measure the effects of 'general' training received in the military such as dealing with large bureaucratic organizations, military discipline and bearing, and the ability to give and take direction. Question (2) addresses the transfer of 'specific' skills acquired in the military which are transferred to the civilian job sector.

The respondents were asked if their military occupational specialty is directly related to their current civilian job.

A secondary issue is the comparison of female veterans' post-service earnings to those of male veterans. Future studies may reference these results in order to determine trends in wages for women.

TABLE 11
GENDER: ENLISTED PERSONNEL AND OFFICERS BY
RESERVE COMPONENT

Gender	USAR	USNR	USMCR	USAFR	TOTAL SELECTED RESERVE
<u>Enlisted</u>					
Male	83%	88%	96%	81%	90%
Female	17%	12%	4%	19%	10%
<u>Officer</u>					
Male	82%	91%	98%	79%	88%
Female	18%	9%	2%	21%	12%

Source: Defense Manpower Data Center, Description of Officer and Enlisted Personnel in the U.S. Selected Reserve, 1986

Notes: total DOD numbers include ARNG and ANG personnel
total Selected Reserve numbers include USCGR personnel

TABLE 12

GENDER: ENLISTED PERSONNEL BY

RESERVE COMPONENT

	AFAR	CONR	USMC R	USAF R	TOT DOD
Male	172,465	12,555	31,122	47,128	768,164
Female	10,314	12,621	1,297	11,055	85,352

Source: Defense Manpower Data Center, Description of Officer and Enlisted Personnel in the U.S. Selected Reserve, 1986

Note: Total DOD numbers include ARNG and ANG personnel

3. Restrictions

Restrictions were imposed on the sample to ensure the comparability of the observations. First, the dataset included only full-time civilian employees. Those reservists who reported part-time employment were deleted. Also, those respondents who reported their status as 'unemployed' were deleted from the sample as were full-time students and homemakers.

The sample was limited to enlisted members who had successfully completed at least one active duty tour. This restriction was established by limiting active duty respondents to the rank of E-3 or higher and by deleting those respondents with fewer than two years of active service.

Separate regressions were run for males and females. This allowed for a comparison of female veterans and female nonveterans by including a veteran status variable to capture

the effects of prior service on civilian wages. The effect of veteran status was measured separately for both males and females in order to measure the veteran-nonveteran differential in wages by gender.

C. Model Determination

A standard **Mincer** natural log of earnings regression equation was specified and estimated. Use of the natural log of wages allows the researcher to investigate the percentage change in income provided by a one unit change in an independent variable (Kosters, 1991).

Independent variables can be categorized as either (1) personal variables, (2) military variables, or (3) occupational variables. Table 13 contains a list of the personal and military variables and their descriptions as derived from the Reserve Components Survey. The expected signs of the coefficients for these variables in the OLS earnings model are also included in Table 13.

Personal variables attempt to capture the individual demographic attributes that may affect the earnings of the survey respondents. The experience variable is included to capture the effect of on-the-job training. The square of the experience variable is used to show its declining influence on wages over time.

Military variables identify the kind of training transferred to the civilian labor market. The variable XFRVET

TABLE 13

PERSONAL AND MILITARY VARIABLES

Personal Variables	Definition	Expected Sign	
CHILD	1 if number of dependents is greater than 2	females	-
		males	+
MARRIED	1 if respondent is married	females	-
		males	+
NONWHITE	1 if respondent is not caucasian	females	?
		males	?
EDUCATION	number of years of formal education	females	+
		males	+
EXPERIENCE	number of years in the workforce	females	+
		males	+
<u>Military Variables</u>			
XFRVET	if a veteran transferred his/her military-acquired skills to civilian job	females	+
		males	+
VETERAN	1 if respondent changed occupations from active duty to civilian	females	-
		males	-
ADJEXP	number of years the respondent has been out of the service or out of school	females	+
		males	+

Source: Author

measures the effect of direct skill transfer from the military to the civilian market. The variable VETERAN distinguishes between those respondents with active service experience and those without. VETERAN captures the effect of general military training on a veteran's post-service income. ADJEXP is a measure of the veteran's time out of the military and the nonveteran's time out of school.

The expected signs for the personal and military variables are contained in Table 13. Signs for military-related variables should be the same for females as they are for males. VETERAN (pertains to general skills) and XFRVET (pertains to specific skills) are expected to have positive coefficients; those respondents with these traits will have greater earnings than those without them. Some personal characteristics are expected to have differing signs for women and men. Women with children can be expected to work fewer hours and earn a lower annual income (Blau and Ferber, 1986). Also, married women are more likely to have disrupted careers, thus the coefficient for the variable MARRIED should have a negative sign. All other coefficients' signs are theorized to be the same for females as they are for males.

Table 14 contains the occupation and industry variables and their respective definitions. Occupation and industry variables are coded as dummy variables in order to determine

the returns to earnings for specific job categories.

The amount of training required to fill any position will tend to vary.

The dependent variable, the natural log of annual income, was derived from the individual's primary civilian job as well as all other income sources. The deletion of part-time workers and those who were unemployed during the period will increase the similarity of the sample population.

TABLE 14
OCCUPATIONAL VARIABLES

Industry Variables	Definition
SELFEMPLOY	Self-Employed
AGRIMIN	Agriculture, Forestry, Fisheries, and Construction
FINANCE	Finance, Insurance, Real Estate, Business
MANUFACTURING	Manufacturing
ENT/REC	Entertainment and Recreation
SALES	Sales
PRO SERVICE	Professional Services
PUBLIC ADMIN	Public Administration
REPSERV	Repair Services
TRANSPORT	Transportation, Communication, and other Public Utilities
GOVERNMENT	State, Local, and Federal Employees
CRAFT	Construction Workers, Mechanics, and Engineers
MANAGER	Administrative, and Managerial
OPMACHINE	Precision Production, Machine Operators, and Assemblers
OPLABOR	Other Handlers and Laborers
WHOLESALE	Wholesale Trade
RETAIL	Retail Trade
PROFESS	Professional, Scientific, Teachers, Technicians, and Education Administration
SERVICE	Protective Service, Postal, and Food Service

Source: Author; created from Reserve Component Survey, 1986.

V. DATA ANALYSIS AND RESULTS

A. Descriptive Statistics

1. Comparison of Means by Veteran Status

Tables 15 through 19 present the sample means for the explanatory variables used below in the earnings models. Each table has been decomposed by veteran status to measure any differences in demographic and occupational characteristics. The means are calculated by gender (Tables 15 and era). T-tests³ were performed on each variable to determine whether differences in the means of the characteristics of veterans and nonveterans are statistically significant. The comparison of subsample means will give an overall indication of group homogeneity.

In Table 15 the average reported annual income for the subsample comprised of all females is \$18,238 for veterans and \$18,408 for nonveterans, a difference of only \$170. This difference in annual income is not statistically significant. In Table 16 differences in annual income between veteran and nonveteran females who joined the service after 1973 are dissimilar to the group composed of all females; veterans

³The null hypothesis is that the means are the same.

(post-1973) earned on average \$2,452 less than nonveterans (significant at the one percent level).

In Table 17 mean income for all males was significantly lower for nonveterans than for veterans (\$22,239 to \$26,115). In Table 18 nonveteran males who enlisted in the reserves during the all-volunteer era also earned significantly less than their veteran male contemporaries (\$17,495 to \$19,504). Both differences were significant at the one percent level.

Educational levels were different for both groups of females. For the cohort of all females in Table 15, nonveterans accrued approximately one-half year less education on average and are 12 percent more likely to have accumulated some college experience. In Table 16, for post-1973 females, the difference drops to about one-fourth of a year, which is still a significant difference.

The difference in educational attainment is even more pronounced for both groups of males. In Table 17 nonveterans from the all male group spent one-half of a year less in school and were 15 percent less likely to go to college than their veteran counterparts. In Table 18 nonveterans from the post-1973 cohort received nearly one-half year less education and were 11 percent less likely to go to college.

A comparison of the female veteran cohorts in Tables 15 and 16 reveals that 22.8 percent of the group of all female veterans held civilian jobs similar to their military

occupations (XFRVET) while 24.4 percent of the post-1973 veterans held similar jobs. For both groups of male veterans, the transfer rates were much lower than they were for females. For all males only 12.0 percent of veterans held similar jobs (Table 17), about half the percentage for females. For post-1973 enlistees, 16.3 percent held similar jobs (Table 18).

Marriage rates were not statistically different for either group of females. The group of all male veterans were 14.5 percent more likely to be married than nonveterans. For the post-1973 group of males, the difference was 11.2 percent.

2. Comparison of Means for Females by Race

For this comparison, the cohort comprised of all females was broken out by race (Table 19). Annual income for the two groups was not statistically different, although the group of nonwhite female veterans earned, on average, \$981 more than white female veterans. Both groups had similar means for COLLEGE and EDUCATION, but white female veterans were 2.2 percent more likely to transfer their military acquired skills. Also, white females were 12.5 percent more likely to have achieved veteran status. Overall, the two groups were reasonably similar.

3. Summary

Overall, nearly one-half of the variables had significantly different mean values between veterans and nonveterans for the sample of all females. Only one-fourth of

the differences in mean values for the post-1973 sample were statistically significant. Since the T-test examines whether the means are statistically different, both groups of females show some statistical resemblance. The opposite can be said for the two male subsamples. The T-test of means for the variables for both groups of males are mostly significant. The implication of the tests is that male veterans and nonveterans have statistically different means.

TABLE 15

COMPARISON OF MEANS FOR
ALL FEMALES BY VETERAN STATUS

<u>Variable</u>	<u>Veterans</u>	<u>Nonveterans</u>	<u>T-TEST (.01)</u>
INCANN	18,238	18,408	0.2451
COLLEGE	0.6176	0.4991	-4.5727 *
CHILD	0.7380	0.7025	-0.7017
EDUCATION	13.7112	13.2940	-4.4319 *
MARRIED	0.3652	0.3226	-1.6921
NONWHITE	0.2734	0.4082	5.5403 *
ADJEXP	8.0429	10.6842	7.3062 *
XFRVET	0.2275	---	---
SELFEMPL	0.0210	0.0227	0.2209
AGRIMIN	0.0669	0.0664	-0.0370
FINANCE	0.0421	0.0804	3.2198 *
MANUFACTURING	0.1033	0.1189	0.9530
ENT/REC	0.0076	0.0052	-0.5499
SALES	0.0459	0.0769	2.5684 *
PROSERV	0.1721	0.1801	0.3982
PUBADMIN	0.4111	0.3252	-3.3550 *
REPSERV	0.0421	0.0402	-0.1761
TRANSPORTATION	0.0746	0.0586	-1.1914
GOVERNMENT	0.5526	0.4563	-3.6638 *
CRAFT	0.0459	0.0210	-2.5642 *
MANAGER	0.1836	0.1547	-1.4391
OPMACHINE	0.0535	0.0708	-1.3886
OPLABOR	0.0172	0.0262	-1.2185
WHOLESALE	0.0096	0.0149	0.9527
RETAIL	0.0593	0.0944	2.6069 *
PROFESS	0.2084	0.1897	-0.8823
SERVICE	0.1185	0.1198	0.0707

Note: * denotes variable is significant at the one percent level.

TABLE 16

COMPARISON OF MEANS FOR
POST-1973 FEMALES BY VETERAN STATUS

<u>Variable</u>	<u>Veterans</u>	<u>Nonveterans</u>	<u>T-TEST (.01)</u>
INCANN	15,687	18,139	3.3829 *
COLLEGE	0.5482	0.4991	-1.5694
CHILD	0.6295	0.6975	1.2544
EDUCATION	13.4940	13.2877	-1.8720 *
MARRIED	0.3645	0.3198	-1.4885
NONWHITE	0.2952	0.4122	4.0074 *
ADJEXP	4.8102	10.1730	19.0767 *
XFRVET	0.2439	---	---
SELFEMPLOY	0.0181	0.0213	0.3731
AGRIMIN	0.0693	0.0638	-0.3482
FINANCE	0.0482	0.0804	2.2391 *
MANUFACTURING	0.1355	0.1183	-0.8124
ENT/REC	0.0060	0.0055	-0.0994
SALES	0.0633	0.0795	1.0333
PROSERV	0.1566	0.1848	1.2160
PUBADMIN	0.3614	0.3161	-1.5145
REPSERV	0.0482	0.0416	-0.4985
TRANSPORTATION	0.0693	0.0591	-0.6453
GOVERNMENT	0.5030	0.4529	-1.5982
CRAFT	0.0542	0.0213	-2.4975 *
MANAGER	0.1566	0.1497	-0.3037
OPMACHINE	0.0723	0.0702	-0.1263
OPLABOR	0.0211	0.0259	0.5179
WHOLESALE	0.0151	0.0148	-0.0357
RETAIL	0.0753	0.0989	1.3786
PROFESS	0.1717	0.1848	0.5515
SERVICE	0.1416	0.1238	-0.8196

Note: * denotes variable is significant at the one percent level.

TABLE 17

COMPARISON OF MEANS FOR
ALL MALES BY VETERAN STATUS

<u>Variable</u>	<u>Veterans</u>	<u>Nonveterans</u>	<u>T-TEST (.01)</u>
INCANN	26,115	22,239	-20.6448 *
COLLEGE	0.4889	0.3387	-25.0020 *
CHILD	1.7421	1.3053	-25.6071 *
EDUCATION	13.3253	12.7854	-23.5190 *
MARRIED	0.7975	0.6530	-26.3735 *
NONWHITE	0.24138	0.1984	-8.4174 *
ADJEXP	14.2252	12.6464	-14.8035 *
XFRVET	0.1202	---	---
SELFEMPL	0.0592	0.0687	3.1285 *
AGRIMIN	0.1455	0.2116	13.9268
FINANCE	0.0251	0.0262	0.5567
MANUFACTURING	0.2054	0.2178	2.4624 *
ENT/REC	0.0031	0.0042	1.5829
SALES	0.0437	0.0658	7.8026 *
PROSERV	0.0745	0.0617	-4.0600 *
PUBADMIN	0.2982	0.1910	-20.4327 *
REPSERV	0.0439	0.0575	4.9643 *
TRANSPORTATION	0.1246	0.0837	-10.9228 *
GOVERNMENT	0.4347	0.2858	-25.4694 *
CRAFT	0.2015	0.2112	1.8666 *
MANAGER	0.1126	0.1007	-3.1387 *
OPMACHINE	0.1326	0.1532	4.7639 *
OPLABOR	0.0447	0.0646	7.0266 *
WHOLESALE	0.0227	0.0360	6.3043 *
RETAIL	0.0518	0.1016	15.0521 *
PROFESS	0.1715	0.1187	-12.1999 *
SERVICE	0.1466	0.1210	-6.0952 *

Note: * denotes that variable is significant at the one percent level.

TABLE 18

COMPARISON OF MEANS FOR
POST-1973 MALES BY VETERAN STATUS

<u>Variable</u>	Veterans	Nonveterans	T-TEST (.01)
INCANN	19,504	17,495	-6.6202 *
COLLEGE	0.3751	0.2696	-10.3966 *
CHILD	1.1493	0.8715	-10.3959 *
EDUCATION	12.8580	12.4752	-11.6704 *
MARRIED	0.6115	0.4996	-10.5887 *
NONWHITE	0.3354	0.2520	-8.4143 *
ADJEXP	5.0725	6.6047	19.0522 *
XFRVET	0.1633	---	---
SELFEMPLOY	0.0516	0.0572	1.1662
AGRIMIN	0.1855	0.2540	7.9022 *
FINANCE	0.0224	0.0210	-0.4657
MANUFACTURING	0.2101	0.2379	3.1237 *
ENT/REC	0.0054	0.0058	0.2251
SALES	0.0458	0.0654	4.1189 *
PROSERV	0.0683	0.0498	-3.5340 *
PUBADMIN	0.2287	0.1133	-13.7244 *
REPSERV	0.0618	0.0742	2.3249 *
TRANSPORTATION	0.0987	0.0664	-5.2830 *
GOVERNMENT	0.3264	0.1824	-15.0527 *
CRAFT	0.1992	0.2112	1.3895
MANAGER	0.0532	0.0562	1.3895
OPMACHINE	0.1432	0.1771	4.3840 *
OPLABOR	0.0685	0.0871	3.2900 *
WHOLESALE	0.0307	0.0364	1.4797
RETAIL	0.0788	0.1307	8.2719 *
PROFESS	0.1403	0.0840	-8.0043 *
SERVICE	0.1832	0.1358	-5.9037 *

Note: * denotes variable is significant at the one percent level.

TABLE 19

COMPARISON OF MEANS FOR
ALL FEMALE VETERANS BY RACE

<u>Variable</u>	<u>Whites</u>	<u>Nonwhites</u>	<u>T-TEST (.01)</u>
INCANN	17,996	18,977	-1.3052
COLLEGE	0.5280	0.5508	1.2910
CHILD	0.5919	0.9246	-6.6041 *
EDUCATION	13.4333	13.4105	0.2567
MARRIED	0.3472	0.3164	1.2910
VETERAN	0.3595	0.2344	5.5239 *
ADJEXP	9.7654	9.9951	-0.6689
XFRVET	0.0795	0.0574	1.7572 *
SELFEMPL	0.0284	0.0115	2.5276 *
AGRIMIN	0.0653	0.0688	-0.2798
FINANCE	0.0587	0.0852	-1.9800 *
MANUFACTURING	0.1135	0.1148	-0.0757
ENT/REC	0.0066	0.0049	0.4513
SALES	0.0662	0.0689	-0.2053
PROSERV	0.1646	0.2000	-1.7850
PUBADMIN	0.3756	0.3115	2.6756 *
REPSERV	0.0417	0.0393	0.2285
TRANSPORTATION	0.0568	0.0754	-1.4507
GOVERNMENT	0.4749	0.5066	-1.2438
CRAFT	0.0407	0.0066	4.9432 *
MANAGER	0.1722	0.1492	1.2414
OPMACHINE	0.0596	0.0754	-1.221
OPLABOR	0.0293	0.0131	2.3351 *
WHOLESALE	0.0180	0.0049	2.6425 *
RETAIL	0.0870	0.0770	0.7209
PROFESS	0.1996	0.1885	0.5531
SERVICE	0.1060	0.1426	-2.1511 *

Note: * denotes variable is significant at the one percent level.

B. Multivariate Analyses

1. The Effects of Veteran Status for Females

The coefficients of the earnings models for all females and volunteer-era females are presented in Tables 20 and 21. As expected, both groups of females had positive returns for transferring military-acquired skills. However, the returns for all females (six percent) and post-1973 females (four percent) were both statistically insignificant. Although insignificant, the positive sign for the coefficients does reflect some desire on the part of civilian employers to hire veterans with these skills.

The coefficients for the variable VETERAN in Tables 20 and 21 represent the effect on earnings of changing occupations. Normally, individuals who change occupations require training from their new employer. Some of the cost of this training must be absorbed by the individual in the form of lower wages. The estimated coefficient for the variable VETERAN for women is positive but insignificant for both groups of females. One possibility is that female veterans realize a slight return from changing occupations to the civilian sector, and that female veterans are at least not penalized for their active duty affiliation. Since the primary reason for the initial drop in income after a job change is the firm's training costs, the value and transferability of

military-acquired training may at least offset the cost to the firm.

Recall that more than 22 percent of the female veterans transferred their military acquired skills to civilian occupations. Tables 20 and 21 indicate that females who transferred skills that they acquired while on active duty (XFRVET) gained a larger earnings advantage than veterans who did not transfer skills. However, once again, the coefficient for the transfer variable for the two groups of females is not significant.

The coefficient for the variable ADJEXP⁴ (Tables 20 and 21) is positive and significant for both groups of females. The immediate effect is approximately a five percent relative gain in earnings for the first year of civilian labor market experience. Tables 22 and 23 were computed by allowing all of the dichotomous variables to be equal to zero and computing various possible combinations of the variables XFRVET, VETERAN, ADJEXP, and ADJEXP2. The intent is to measure the partial effects on ln-earnings of active duty affiliation and civilian labor market experience. Table 22 shows the effects of post-military civilian labor market experience for female veterans who have civilian jobs similar to those they held in the military versus females who have chosen different occupations. The net effect is that annual income increases an

⁴The variable ADJEXP represents an adjustment in civilian labor market experience for veterans' time on active duty.

average of nearly four percent per year for a ten-year period, but is slightly reduced over time.

Estimated coefficients for the active duty-related variables indicate that female veterans realize no noticeable earnings penalty upon leaving the service. This observation holds true for both groups of female veterans. Table 22 indicates that the return for veteran status and skill transfer increases income by 50 percent after the individual has been out of the service for ten years.

As presented in Tables 20 and 21, married females with children earned over five percent less than single females. This earnings penalty was expected since married women with children tend to have less time to invest in their own human capital. However, the coefficient for CHILD was statistically insignificant.

The greatest return on occupational variables for both groups of females was for those employed in the finance, entertainment/recreation, public administration, and transportation industries. Those who were self-employed or worked in sales had negative returns.

TABLE 20
COEFFICIENTS FOR ALL FEMALES

Variable	Coefficient	T-Statistic
CHILD	-0.0006	-0.033
EDUCATION	0.0391	4.315 ***
MARRIED	-0.05507	-1.686 *
NONWHITE	-0.0200	-0.635
ADJEXP	0.0496	7.036 ***
ADJEXP2	-0.0008	-3.115 ***
SELFEMPLOY	-0.2996	-3.000 ***
AGRIMIN	0.5430	4.259 ***
FINANCE	0.7525	5.990 ***
MANUFACTURING	0.6327	5.126 ***
ENT/REC	0.8909	4.073 ***
SALES	-0.0097	-0.132
PROSERV	0.5366	4.431 ***
PUBADMIN	0.7204	5.790 ***
REPSERV	0.4871	3.714 ***
TRANSPORTATION	0.7723	6.041 ***
GOVERNMENT	0.0552	1.176
CRAFT	0.3517	3.858 ***
MANAGER	0.2345	5.261 ***
OPMACHINE	0.0574	0.813
OPLABOR	0.0172	0.172
WHOLESALE	0.6749	3.965 ***
RETAIL	0.3568	2.824 ***
PROFESS	0.2421	5.334 ***
SERVICE	0.2024	3.955 ***

TABLE 20 (cont.)
COEFFICIENTS FOR ALL FEMALES

Variable	Coefficient	T-Statistic
VETERAN	0.0243	0.675
XFRVET	0.0602	0.965
INTERCEPT	7.9603	48.300 ***
R-SQUARE	.2371	
ADJ R-SQUARE	.2245	
F-STATISTIC	18.844	
Sample Size		1664

* denotes coefficient significant at .10 level

*** denotes coefficient significant at .01 level

TABLE 21
COEFFICIENTS FOR POST-1973 FEMALES

Variable	Coefficient	T-Statistic
CHILD	-0.0091	-0.475
EDUCATION	0.0365	3.624 ***
MARRIED	-0.0578	-1.610 *
NONWHITE	-0.0078	-0.226
ADJEXP	0.0494	5.588 ***
ADJEXP2	-0.0006	-1.772 *
SELFEMPLOY	-0.4024	-3.528 ***
AGRIMIN	0.5689	4.250 ***
FINANCE	0.7722	5.917 ***
MANUFACTURING	0.6220	4.851 ***
ENT/REC	0.7907	3.262 ***
SALES	-0.0077	-0.100
PROSERV	0.5275	4.174 ***
PUBADMIN	0.7101	5.465 ***
REPSERV	0.4324	3.160 ***
TRANSPORTATION	0.7519	5.591 ***
GOVERNMENT	0.0433	0.837
CRAFT	0.3961	3.996 ***
MANAGER	0.2327	4.627 ***
OPMACHINE	0.0368	0.485
OPLABOR	0.0266	0.249
WHOLESALE	0.6369	3.615 ***
RETAIL	0.3613	2.763 ***
PROFESS	0.2221	4.330 ***
SERVICE	0.2126	3.870 ***

TABLE 21 (cont.)

COEFFICIENTS FOR POST-1973 FEMALES

Variable	Coefficient	T-Statistic
VETERAN	0.0228	0.500
XFRVET	0.0434	0.562
INTERCEPT	7.9903	44.963 ***
R-SQUARE	.2353	
ADJ R-SQUARE	.2204	
F-STATISTIC	15.772	
Sample Size		1411

* denotes coefficient significant at .10 level

*** denotes coefficient significant at .01 level

TABLE 22

COMPARISON OF CIVILIAN LABOR MARKET EXPERIENCE EFFECTS ON
LN-EARNINGS FOR ALL FEMALE VETERANS

YEAR	WITHOUT XFRVET (A)	WITH XFRVET (B)	CHANGE/YEAR (from column B)
1	0.0718	0.1324	-----
2	0.1194	0.1800	0.0476
3	0.1654	0.2260	0.0460
4	0.2098	0.2704	0.0444
5	0.2526	0.3132	0.0428
6	0.2946	0.3552	0.0420
7	0.3334	0.3940	0.0388
8	0.3714	0.4320	0.0380
9	0.4078	0.4684	0.0364
10	0.4426	0.5032	0.0348

TABLE 23

COMPARISON OF CIVILIAN LABOR MARKET EXPERIENCE EFFECTS ON
LN-EARNINGS FOR ALL MALE VETERANS

YEAR	WITHOUT XFRVET (A)	WITH XFRVET (B)	CHANGE/YEAR (from column B)
1	0.1139	0.1832	-----
2	0.1576	0.2269	0.0437
3	0.1997	0.2690	0.0421
4	0.2402	0.3095	0.0405
5	0.2791	0.3484	0.0389
6	0.3164	0.3857	0.0373
7	0.3521	0.4214	0.0357
8	0.3862	0.4555	0.0341
9	0.4178	0.4880	0.0325
10	0.4496	0.5189	0.0309

2. The Effects of Veteran Status for Males

The two groups of males, all and post-1973, showed positive returns to transferring their military-acquired skills. The post-1973 group realized a return of only 2.2 percent (Table 25), while the group of all males gained 7.2 percent for transferring skills (Table 24). The observed positive coefficients could be a factor of higher demand for military acquired training. This finding is consistent with other studies (Mehay, 1992; Mangum and Ball, 1989).

Males received a positive return for leaving the service and entering the civilian labor market (VETERAN). The size of the return was 7.2 percent for all males and 10.0 percent for post-1973 males (Tables 24 and 25). Since this positive effect is significant for both groups of veterans, civilian employers appear to place added value on all training received in the military, at least for male veterans.

As was noted for the female veterans, male veterans see their income grow as the number of years out of service increases. The coefficients for the variable ADJEXP (Tables 24 and 25) are both positive and significant. The return on years of civilian labor market experience is approximately five percent for the group of all males and six percent for the post-1973 group. These figures closely resemble the observed values for females' returns on years of experience. Table 23 shows that after the veteran has been out of the service for

ten years, his annual income will have increased by 51.9 percent due to the partial return to wages of the military variables.

The coefficients for the variables MARRIED and CHILD (Tables 24 and 25) have the opposite effect on annual income of males as they do on the annual income of females. This result is statistically significant. Males employed in the manufacturing, public administration, and transportation industries had the highest returns on annual income. Males whose occupations were in labor, service, and retail had negative returns to annual income.

3. The Results for Race

Table 26 shows the decomposition of the veteran-related variables by race and gender to measure the partial effects of veteran status on the four groups after one year of civilian experience. The Appendix contains a table that displays the regression results for different racial groups. Although all of the results were positive, the smallest return was for white females (6.7 percent). Nonwhite males and females had the highest returns to their incomes (23.3 percent and 27.7 percent, respectively). This result could be an indication that the military is an effective "bridge" for minorities into higher paying occupations.

TABLE 24
COEFFICIENTS FOR ALL MALES

Variable	Coefficient	T-Statistic
CHILD	0.0195	6.628 ***
EDUCATION	0.0572	26.393 ***
MARRIED	0.1141	12.397 ***
NONWHITE	-0.1146	-13.153 ***
ADJEXP	0.0459	30.727 ***
ADJEXP2	-0.0008	-17.968 ***
SELFEMPLOY	0.0512	3.439 ***
AGRIMIN	0.1002	2.648 ***
FINANCE	0.2077	4.987 ***
MANUFACTURING	0.2302	6.093 ***
ENT/REC	-0.0251	-0.363
SALES	0.1161	5.909 ***
PROSERV	0.0115	0.288
PUBADMIN	0.2438	6.235 ***
REPSERV	0.0070	0.179
TRANSPORTATION	0.3719	9.654 ***
GOVERNMENT	0.0358	2.855 ***
CRAFT	0.0928	7.730 ***
MANAGER	0.1516	10.400 ***
OPMACHINE	0.0329	2.375 ***
OPLABOR	-0.0710	-3.998 ***
WHOLESALE	0.1351	3.180 ***
RETAIL	-0.0311	-0.793
PROFESS	0.1642	11.889 ***
SERVICE	-0.0088	-0.641

TABLE 24 (cont.)
COEFFICIENTS FOR ALL MALES

Variable	Coefficient	T-Statistic
VETERAN	0.0722	9.565 ***
XFRVET	0.0718	5.002 ***
INTERCEPT	8.3570	177.3225 ***
R-SQUARE	.2677	
ADJ R-SQUARE	.2670	
F-STATISTIC	355.279	
Sample Size	26263	

* denotes coefficient significant at .05 level

*** denotes coefficient significant at .01 level

TABLE 25
COEFFICIENTS FOR POST-1973 MALES

Variable	Coefficient	T-Statistic
CHILD	0.0107	1.630 *
EDUCATION	0.0594	12.284 ***
MARRIED	0.1075	6.943 ***
NONWHITE	-0.1154	-7.501 ***
ADJEXP	0.0591	14.983 ***
ADJEXP2	-0.0015	-7.887 ***
SELFEMPLOY	0.1078	3.631 ***
AGRIMIN	0.0166	0.279
FINANCE	0.1764	2.511 ***
MANUFACTURING	0.1196	2.000 ***
ENT/REC	-0.1149	-1.093
SALES	0.0934	2.704 ***
PROSERV	-0.1086	-1.660 *
PUBADMIN	0.1918	2.986 ***
REPSERV	-0.0684	-1.116
TRANSPORTATION	0.2536	4.042 ***
GOVERNMENT	0.0726	2.856 ***
CRAFT	0.0092	4.524 ***
MANAGER	0.1868	5.634 ***
OPMACHINE	0.5544	2.193 ***
OPLABOR	-0.0388	-1.362
WHOLESALE	0.0647	0.950
RETAIL	-0.1060	-1.733 *
PROFESS	0.2022	7.137 ***
SERVICE	-0.0183	-0.738

TABLE 25 (cont.)
COEFFICIENTS FOR POST-1973 MALES

Variable	Coefficient	T-Statistic
VETERAN	0.0998	6.157 ***
XFRVET	0.0216	0.672
INTERCEPT	8.3367	95.586 ***
R-SQUARE	.1389	
ADJ R-SQUARE	.1366	
F-STATISTIC	60.634	
Sample Size	10173	

* denotes coefficient significant at .05 level

*** denotes coefficient significant at .01 level

TABLE 26

**RETURN TO VETERAN STATUS AND TRANSFER OF SKILLS AFTER
ONE YEAR OUT OF SERVICE**

	XFRVET	VETERAN	ADJEXP	ADJEXP2	Return
White Females	+0.011	+0.003	+0.054	-0.0011	+0.067
Nonwhite Females	+0.196	+0.049	+0.033	-0.0001	+0.277
White Males	+0.077	+0.051	+0.047	-0.0008	+0.173
Nonwhite Males	+0.043	+0.147	+0.043	-0.0007	+0.233

Note: Appendix includes full regression results for this table.

4. Earnings Comparison by Gender and Veteran Status

As presented in Sections One and Two, veterans tend to have higher earnings than nonveterans upon entering the civilian labor market. Table 27 presents the results of four regressions differentiated by gender and veteran status. To compare the effects of civilian labor market experience on veterans and nonveterans, all the dummy variables were set to zero and the variable EDUC was given the value 13 (the approximate mean for all groups). The values for INTERCEPT and EDUC became constants. This left the coefficients for ADJEXP and ADJEXP2 as the only variables in the ln-earnings equation. The equations for veterans and nonveterans were set equal to each other to determine at what level of civilian labor market experience their wages would be equal. Females' annual

earnings merged at 9.3 years of labor market experience. For males, 10.2 years of labor market experience was the point of intersection. At this point, nonveteran and veteran males earned the same annual income.

The derivative of ln-earnings with respect to ADJEXP presents the amount of labor market experience at which there is no longer any return on one more year of additional experience. The number of years for both groups of males was similar, 39.9 years for veterans and 38.8 years for nonveterans. The difference for females was 25.4 years (26.7 years for veterans and 52.1 years for nonveterans).

TABLE 27
REGRESSION RESULTS BY GENDER
AND VETERAN STATUS

Variable	<u>Females</u>		<u>Males</u>	
	VETS	NONVETS	VETS	NONVETS
INTERCEPT	8.0271*	7.9206*	8.5434*	8.2696*
CHILD	-0.0195	0.0039	0.0224*	0.0075
EDUC	0.0390*	0.0398*	0.0534*	0.0603*
MARRIED	-0.0404	-0.0764*	0.1148*	0.1037*
NONWHITE	0.0431	-0.0494	-0.0879*	-0.1501*
ADJEXP	0.0444*	0.0544*	0.0384*	0.0564*
ADJEXP2	-0.0010*	-0.0008*	-0.0007*	-0.0010*
SELFEMPL	-0.7523*	-0.1176	0.0385*	0.0578*
AGRIMIN	0.5740*	0.5496*	0.1162*	0.0919*
FINANCE	0.6815*	0.7731*	0.1620*	0.2586*
MANUFACT	0.5982*	0.6455*	0.2559*	0.2055*
ENT/REC	1.1193*	0.7103*	-0.0358	-0.0059
SALES	0.0470	-0.0341	0.1260*	0.1090*
PROSERV	0.5448*	0.5377*	0.0176	0.0191
PUBADMIN	0.8125*	0.6702*	0.2460*	0.2491*
REPSERV	0.5237*	0.4831*	0.0101	0.0097
TRANSPORT	0.7098*	0.8329*	0.4082*	0.3174*
GOVERN	0.0289	0.0719	0.0448*	0.0111
CRAFT	0.4040*	0.2702*	0.0881*	0.0969*
MANAGER	0.2194*	0.2367*	0.1463*	0.1551*
OPMACHINE	0.0978	0.0335	0.0141	0.0532
OPLABOR	0.0632	0.0032	-0.1019*	-0.0396
WHOLESALE	0.5973*	0.7029*	0.1408*	0.1246
RETAIL	0.2541	0.3981*	-0.0342	-0.0247
PROFESS	0.3201*	0.1985*	0.1564*	0.1699*
SERVICE	0.2216*	0.1950*	-0.0209	0.0022

Note: * denotes significance of coefficient at the 10 percent level.

VI. CONCLUSIONS AND RECOMMENDATIONS

The intent of this thesis was to investigate different earnings models in order to measure any significant post-military income differences between veteran and nonveteran females, and to compare the veteran-nonveteran differentials for females with that of males. The Reserve Components Survey allowed for the minimization of selectivity bias by including respondents who have been screened for military service, thus ensuring a near homogeneous sample.

The primary question addressed in this thesis was: Do female veterans have higher earnings after leaving the service than do their civilian contemporaries? Although the net effect of the job change (VETERAN) and the transfer of military skills to their new occupation (XFRVET) may have a positive effect on the civilian wages of veterans, any differences evaporate after approximately nine years in the civilian sector. Therefore, the returns for military service may not be large, but in the long run active duty females earn somewhat higher incomes than their civilian contemporaries, all things being equal.

A secondary question examined in this thesis was: Do female veterans close the 'gender gap' in relative pay between males and females. Examination of mean annual incomes reveals

that female veterans earn approximately 80 percent of what male nonveterans earn, on average. Historically, the gender gap has been 30 to 40 percent (Blau and Ferber, 1986). This thesis shows that white female veterans earn approximately 70 percent of the earnings of male veterans. When female veterans are compared to male nonveterans, the gap closes to 18 percent⁵. Comparatively, the average female veteran in this sample has slightly lower earnings than her nonveteran counterpart. This differential is due primarily to differences in years of civilian labor market experience.

Skill training received by individuals in the different services varies due to operational necessity and specific mission. The Navy and the Air Force have the greatest number of technical fields while the Army tends to incorporate more military specific training that may require lower skills. Opportunity for the most sought after and financially beneficial high-tech training is greater in the Navy and Air Force. The size of the sample necessitated the grouping of all female veterans. This made interpretation of regression results by service impossible. Other authors have found significant differences in returns to military training by branch of service for males. If this hypothesis holds true for females, then there may be some impact on wages depending upon branch of service for this group also. The size of the Army

⁵Computed from mean annual incomes.

cohort could have a significant impact on the coefficient for grouped veteran status. However, removal of Army veterans from the sample leaves too few observations to draw any conclusions. Future studies should examine post-service wage differentials by branch of service to examine the effects of each services' training.

The data from this survey are nearly a decade old. If the trends noted by Eitelberg (1988) hold true, then it is expected that females will be increasingly interested in the high-tech occupations in the military. Force composition by gender may have changed significantly in the last eight years, and female enlistees should be reaping the benefits of their military experience. Increasing female participation in the armed forces should make statistical examination of the current 1991 Reserve Components Survey more insightful, and provide greater detail into the investigation of female veterans' wages.

APPENDIX

REGRESSION COEFFICIENTS BY RACE AND GENDER

Variable	<u>Females</u>		<u>Males</u>	
	WHITES	NONWHITES	WHITES	NONWHITES
INTERCEPT	7.9712*	7.9286*	8.3449*	8.2701*
CHILD	0.0045	0.0091	0.0278*	-0.0045
EDUC	0.0329*	0.0515*	0.0548*	0.0641*
MARRIED	-0.0820*	-0.0153	0.1019*	0.1479*
ADJEXP	0.0538*	0.0320*	0.0467*	0.0425*
ADJEXP2	-0.0011*	-0.0001	-0.0008*	-0.0007*
SELFEMPL	-0.1455	-0.8984*	0.0600*	-0.0141
AGRIMIN	0.5916*	0.5055*	0.1415*	0.0047
FINANCE	0.8365*	0.6256*	0.2414*	0.1217
MANUFACT	0.6880*	0.5929*	0.2751*	0.1086
ENT/REC	0.8756*	0.7978*	-0.0249	0.0173
SALES	0.0645	-0.2178	0.1246*	0.0733
PROSERV	0.6286*	0.4347*	0.0730	-0.1485*
PUBADMIN	0.7314*	0.6729*	0.2930*	0.1255
REPSERV	0.5258*	0.4614*	0.0510	-0.1035
TRANSPORT	0.8229*	0.6752*	0.3989*	0.3055*
GOVERN	0.1576*	-0.0667	0.0309*	0.0386
CRAFT	0.3652*	0.1514	0.0932*	0.0910*
MANAGER	0.2270*	0.2314*	0.1624*	0.1070*
OPMACHINE	0.0880	-0.0053	0.0241*	0.0668*
OPLABOR	0.0276	0.0260	-0.0697*	-0.0815*
WHOLESALE	0.7702*	0.4395	0.1794*	0.0178
RETAIL	0.3046*	0.5577*	0.0054	-0.1130
PROFESS	0.2444*	0.2374*	0.1716*	0.1414*
SERVICE	0.1514*	0.2697*	-0.0028	-0.0265

Note: * denotes variable is significant at the 10 percent level

REGRESSION COEFFICIENTS BY RACE AND GENDER
(cont.)

Variable	<u>Females</u>		<u>Males</u>	
	WHITES	NONWHITES	WHITES	NONWHITES
VETERAN	0.0026	0.0485	0.0514*	0.1465*
XFRVET	0.0114	0.1960	0.0770*	0.0425
Sample Size	1055	608	20457	5805
R-SQUARED	.3014	.2013	.2943	.1891
ADJ R- SQUARED	.2837	.1656	.2934	.1854
F-VALUE	17.071	5.641	327.647	51.825

Note: * denotes coefficient significance at 10 percent.

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Thesis

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c.1 An analysis of post-
service career earnings
of female veterans.



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